The Impact of Policies on Food Security Using the PEDA Model: A Case Study of Botswana, Cameroon and Ethiopia

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Population, Environment, Development and Agriculture (PEDA) Model is an interactive computer simulation model (developed for MS-Windows), demonstrating the medium to long-term impacts of alternative national policies on the food security status of the population.

Through the manipulation of scenario variables, the model enables the user to project the proportion of the population that will be food secure and food insecure for a chosen point in time. As food security is a factor of development in the field of population, agriculture, the environment and socio-economic development, the model demonstrates the relationships between these fields as well. There is an HIV/AIDS component that illustrates its impact on the other variables in the model. The PEDA, therefore, is a model that gives answers to a wide range of policy questions regarding the nexus interactions.

The Model has been initialised for three countries, namely, Ethiopia, Cameroon and Botswana.

Botswana

The simulation results for Botswana considering a morbidity rate of 25 per cent per year and reducing the rate over time by 2 per cent a year due to HIV/AIDS yields the following results:

Considering the food insecure populations by urban and rural residence, the elderly constitutes 18 and 16 per cent respectively by 2050.

The effect of the following mixed policies:

- Reduction in HIV/AIDS mortality of 25 per cent by 4 per cent per year;
- Increase in literacy to 0.7 per cent for females and 0.6 per cent for males;
- An increase in technical education by 1 per cent per year;
- An increase in net food imports by 2 per cent per year;
- An increase in irrigation by 1 per cent per year; and
- An increase in fertilizer use of 1 per cent per year.

will lead to lower proportions of the food insecure by about 41 per cent by the year 2050 (ECA, Botswana 2001). This set of policies scenario shows the importance of a multidisciplinary and multisectoral approach to planning and policy making.

Cameroon:

Part of the population in Cameroon faces food insecurity. The country faces deforestation while land degradation has begun to set in. The good news is that their policy makers are aware of the importance of the population-environment and agriculture nexus issues and policies that have been formulated take account of the inter-linked relations of the nexus issues.

Cameroon has formulated a strategic plan for sustainable development of the country. The PEDA analysis shows that without this plan, there will be a sharp increase in the weakest sub-group of the population that is “Rural, illiterate, food insecure”. However, if the strategic plan is well implemented, there will be a positive impact on food security and on the standard of living in Cameroon (ECA, Cameroon 2001).

Ethiopia:

Over the last two decades, Ethiopia has been in the headlines of recurrent wars and famine. Reduced rainfall, conflicts and a malfunctioning of the distribution system have led to acute food security problems. About 50 to 60 percent of the population is considered chronically food insecure.

The assumptions of the baseline scenario for Ethiopia are as follows:

Net Food Imports: It is assumed that food imports will increase by 2 per cent a year, reaching a level of 1,240,000 tons annually by the year 2030.

Water: The observed rainfall pattern during the cropping seasons is used for the period 1995-1999. From the year 2000 onwards, the observed rainfall pattern for 1992-1999 is repeated.

Irrigation: The baseline scenario assumes an annual increase in irrigated land of 1 per cent.

Machinery use: It is assumed that machinery use will increase by 0.5 per cent a year.

Technical Education: It is assumed that the level of technical education of the agricultural labour force will increase at an annual rate of 1.5 per cent.

Food Distribution: Food is distributed proportionally to the number of people living in rural and urban areas.

The baseline assumptions are assumed to be optimistic

Simulation Results

The projection based on this baseline scenario is not positive. It shows that per capita agricultural production by the end of the next 25 years will be less than 80 per cent of what it was in 1995. Similarly, the proportion of food insecure in the population is expected to increase over the projection period by almost 10 per cent while food imports will increase by more than 7 per cent annually in order to stabilize the proportion of food insecure people in the country (ECA, Ethiopia 2001).

The rural food insecure segment of the population is expected to grow the fasters (more than double by 2030). As a result, the land stock is estimated to maintain only 86 per cent of its productive capacity by the year 2030. (ECA, Ethiopia 2001)

Scenario with HIV/AIDS

Ethiopia is a country with a high prevalent rate of HIV/AIDS of about 10 percent. We add a scenario of AIDS morbidity. To add to the baseline assumptions, we assume that AIDS morbidity levels will increase in the second half of the 1990s to reach 2 per cent per year by the year 2000. After that, morbidity levels will be around 2.15 per cent per year for the next decade and then start declining gradually.

The PEDA predicts that per capita food production will drop to less than 75 percent of what it was in 1995. As a result, the share of the food insecure segment will increase to more than 75 percent of the population by 2030.

Policies to reverse the Vicious Circle

Three sets of policy scenarios have been envisaged to depart from the baseline scenario.

1. Increase in technological inputs in agriculture. It assumes an annual increase in fertilizer use of 6 per cent, in machinery use of 1 per cent, in irrigation and technical education of 2 per cent. This means that by 2030, fertilizer use will be more than 7.5 times higher than in the initial year, that irrigation and technical education will double and that machinery use will be 1.5 times higher.

2. The second scenario assumes almost universal education (95 per cent) in both rural and urban areas and a steeper fertility decline to reach TFR of 2.4 by the year 2030.
3. This scenario combines the two scenarios.

Simulation Results

Increased efforts in agricultural intensification or education and fertility alone, may be capable of improving the situation in the short run, but the proportion of the food insecure tends to increase again after 20 to 30 years. The combined scenario has a more positive impact on food security. The PEDA projections show that a solution for the food security problem in Ethiopia is not likely to be found in one sector alone. A combined set of policies in many sectors is likely to address the food security problem in Ethiopia.

References

ECA; "PEDA Advocacy Booklet: Projections for Ethiopia, Addis Ababa, Nov. 2001.

ECA: "PEDA Advocacy Booklet: Projections on Aging for Botswana, Addis Ababa, Nov. 2001

ECA: "PEDA Advocacy Booklet: Case Study: Cameroon, Addis Ababa, Nov. 2001.